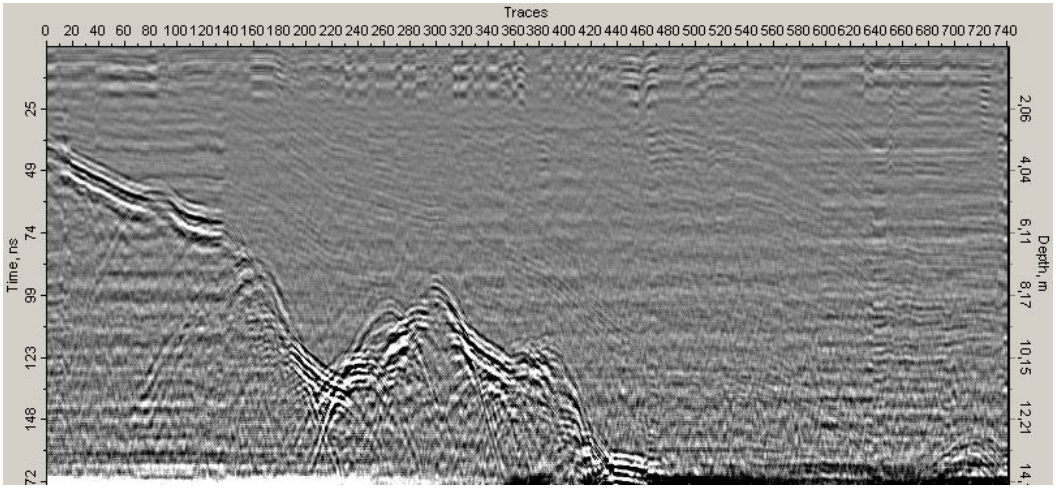
TRANSIENT TECHNOLOGIES

Georadar series VIY®

User Manual



Hardware version 2, software version 2.0.9.3

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Purpose of ground probing radar of series VIY2®

Ground probing radar (GPR) is intended for nondestructive research of various soils.

GPR is intended for use by geophysicists, builders, the ecological organizations for detection and the control of a condition of underground communications, including plastic and asbestos cement pipes; places of underground flood of water, petroleum; groundwater levels and waterproof layers; for research of building designs and reflecting walls, etc.

The equipment of delivery

Your device includes:

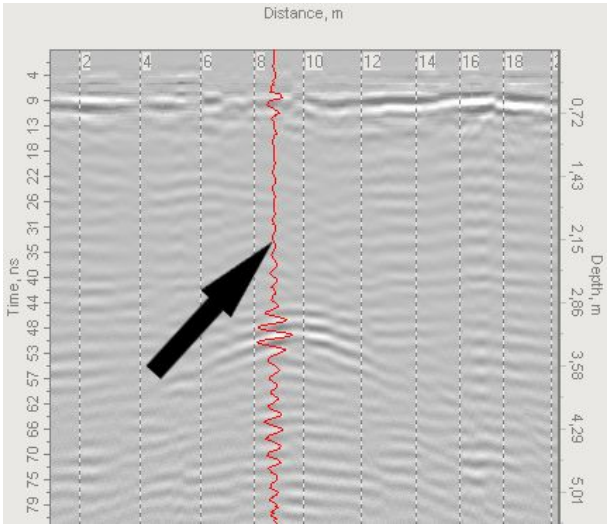
- the radar
- the base set of software
- the charger
- the cable to connect to a computer
- additionally, the kit can include measuring wheel (odometer). When ordering a set of wheels presence negotiated separately

☑ **Notebook is not included into the complete set of delivery and must be purchased separately.**

Requirements to a computer

For operation with a GPR is needed a computer (a notebook) with operational system Windows 98 and above, the RAM not less than 64 MB, not less than 100 MB of free hard disk space to store received data, serial port COM or USB1/USB2.

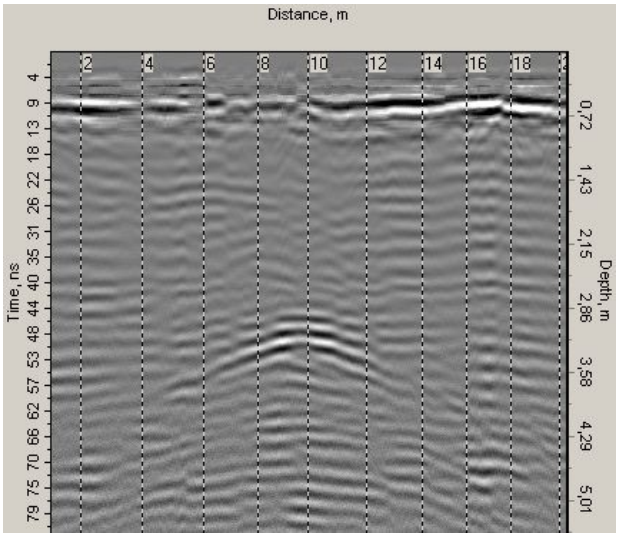
Terms and concepts



Sample – the elementary part of the trace represents one point on the profile.

Trace – a set of samples making result of measurement in one point of a profile. In a profile it is reflected in the form of one column of points of different brightness or, at use of the tool the Trace, in the form of a red curve.

- The button of the tool the Trace in the left panel of tools



Profile – a two-dimensional picture, at which on a vertical depth (range), and across moving of the aerial. The profile consists of traces; value of amplitude in traces of a profile is reflected by means of a color palette, by default by gradation grey or transition of colors.

TVGC – time varying gain control. The inflexion of the amplification on the depth, which compensates for the easing of the signal due to the distribution in soil.

Tools – the program tool for processing a profile with the purpose to improve detection and identification underground targets.

Parameters of GPR VIY2-700

Antenna frequency: 700 MHz

Dynamic range: at least 120 dB

Pulse repetition frequency (PRF): 20 kHz

Survey window: from 14 to 256 ns

Number of samples per trace: from 2 up to 1023 (programmable)

Traces stacking number: from 9 (1023 samples) to 156 (64 samples) (programmable)

Time varying gain control (TVGC) range: 48 dB

The TVGC shape: arbitrary

Depth of sounding: up to 2 meters (determined by soil properties)

Spatial resolution: less than 0.15 m

Operating modes: point collection, continuous, measuring wheel

Size of the file of a single profile: up to 2 GB

Interface: RS232/USB

Data transfer rate: 115200 bps

Dimensions: 410 x 190 x 155 mm

Weight: 2.4 kg

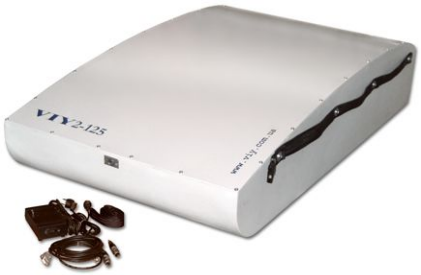
Operating temperature: -10°C to 40°C

Continuous operation time: at least 8 hours

Parameters of GPR VIY2-300

Antenna frequency: 300 MHz
Dynamic range: at least 120 dB
Pulse repetition frequency (PRF): 20 kHz
Survey window: from 50 to 450 ns
Number of samples per trace: from 2 up to 1023 (programmable)
Traces stacking number: from 9 (1023 samples) to 156 (64 samples) (programmable)
Time varying gain control (TVGC) range: 48 dB
The TVGC shape: arbitrary
Depth of sounding: up to 8 meters (determined by soil properties)
Spatial resolution: less than 0.3 m
Operating modes: point collection, continuous, measuring wheel
Size of the file of a single profile: up to 2 GB
Interface: RS232/USB
Data transfer rate: 115200 bps
Dimensions: 580 x 340 x 170 mm
Weight: 7.5 kg
Operating temperature: -10°C to 40°C
Continuous operation time: at least 8 hours

Parameters of GPR VIY2-125



Antenna frequency: 125 MHz

Dynamic range: at least 120 dB

Pulse repetition frequency (PRF): 20 kHz

Survey window: from 50 to 450 ns

Number of samples per trace: from 2 up to 1023 (programmable)

Traces stacking number: from 9 (1023 samples) to 156 (64 samples) (programmable)

Time varying gain control (TVGC) range: 48 dB

The TVGC shape: arbitrary

Depth of sounding: up to 15 meters (determined by soil properties)

Spatial resolution: less than 1.0 m

Operating modes: point collection, continuous, measuring wheel

Size of the file of a single profile: up to 2 GB

Interface: RS232/USB

Data transfer rate: 115200 bps

Dimensions: 1100 x 575 x 240 mm

Weight: 22 kg

Operating temperature: -10°C to 40°C

Continuous operation time: at least 8 hours

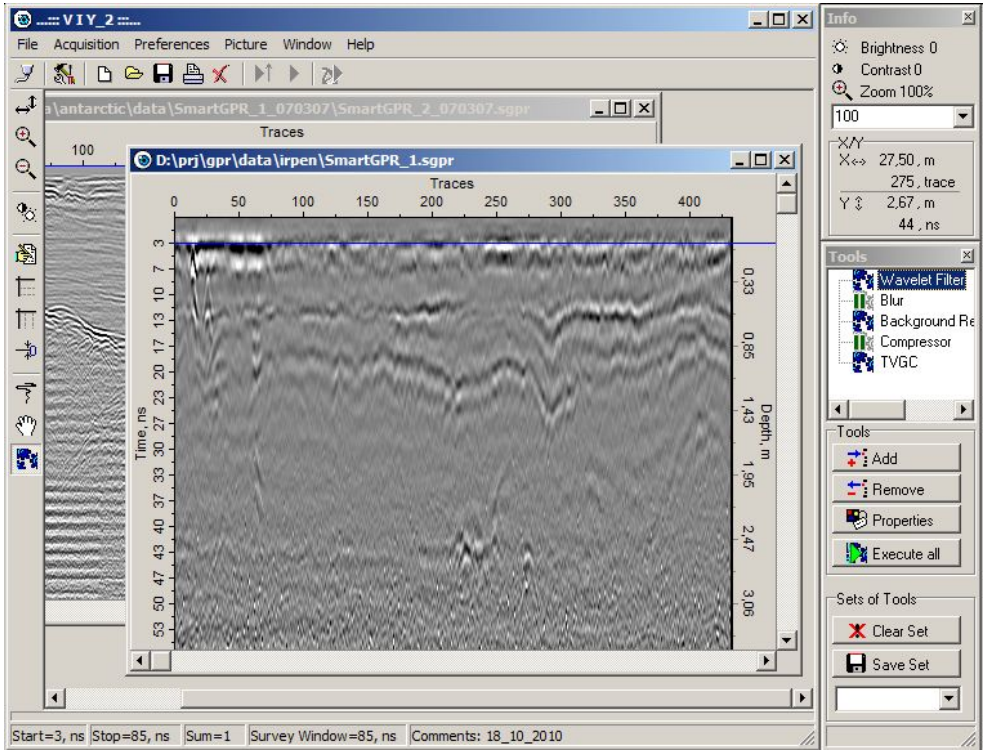
The main window of program Synchro2

The program for work with GPR of series VIY2 has one main window in which windows of echograms open in the form of branch windows. Except for the main window there are also service windows:

Info - a window that reflects the current value

- Brightness
- Contrast
- Scale

Tools - a window in which controls by tools and their sets are located.



The main menu has the main window, two toolbars and the status bar.

The Main Menu

File			
	Create	**Ctrl+N**	Creates a new window of a GPR profile
	Open	Ctrl+O	Opens a window of a profile
	Reopen		Contains up to 16 sub items for the rapid opening of profiles. Last saved profiles upload in these items.
	Import		It contains as many items, as plug-ins of import are available in system
	Save	Ctrl+S	Preservation of a profile in a file with a current name
	Save as		Preservation of a structure at which a dialogue appears to allow specifying a name of a file and a location of a file.
	Export		Contains items for export of a profile to graphic formats besides it is as many formats, as plug-ins of export are available in system
	Close	Ctrl+F4	Closes the current profile
	Print…	Ctrl+P	Provokes a dialogue of a print
	Exit		Closes the program
Acquisition			
	Step	F8	Availably if the consecutive port is opened If the GPR is connected it turns on step-by-step measurement at which one trace is measured, after that for continue of measurement you should re-click menu: steps or the button F8 on the keyboard
	Run	F9	Availably if the consecutive port is opened It turns on/turns off the continuous measurement if the GPR is connected
	Run of	F10	Availably if the consecutive port is opened It

	the Wheel		turns on/turns off the measurement with using odometer if the GPR is connected
Preferences			
	Port Settings		Provokes a dialogue setting of the serial port : number of port, opening/closing of port, etc.
	General Preferences		Provokes a dialogue in which it is setting axis of coordinate for profiles, the type of radar and step of a measuring tool of the horizontal distance
	Acquisition Settings		Provokes occurrence of a window of setting of a current profile: to choose the depth of sounding, to adjust a curve of amplification, etc.
	Language		It contains a menu to switch the interface language: English, Russian
Picture			
	Brightness/contrast	**Ctr+F**	Provokes the dialogue of the adjustment of the brightness, of the contrast of a profile
	Zoom In	Ctr+L	Changes the scale of the echogram in a side of the increase
	Zoom Out	Ctrl+K	Changes the scale of the echogram in a side of the decrease
	Zoom to Width	Ctrl+W	Changes scale up to such value at which the width of a window of a profile becomes equal the width of the main window of the program
	Zoom to Height	Ctrl+H	Changes scale up to such value at which the height of a window of a profile becomes equal the height of the main window of the program
	Open Palette		Opens the dialogue of a choice of a palette for reflecting of a profile
Window			

	Info	Ctrl+I	Turn on / off the Info window with the information about the brightness, contrast and scale
	Tools	Ctrl+O	Turn on / off a window of management of filters of processing of a structure
	Cascade		Disposes all the windows of profiles in the form of the cascade
	Tiled Vertical		Disposes all windows of profiles so, that their height to become the equal height of main window, and a width is divided between all windows of profiles
	Tiled Horizontal		Disposes all windows of profiles so, that their width to become the equal width of main window, and a height is divided between all windows of profiles.
	Arrange Icons		Puts in order all profiles convoluted in icons
	Minimize All		Minimizes all windows of profiles in icons

Toolbars

Commands of the main menu which we use the most often duplicated the buttons on the toolbars

Upper (horizontal) toolbar

Causes the window of setting of port

Causes the window of setting of profile (Ctrl+A)

Creates a new profile (Ctrl+N)

Opening of a profile (Ctrl+O)

Save of a profile (Ctrl+S)

To print a profile with the current setting of printer

To close a current profile (Ctrl+F4)

Step-by-step measuring (F8)

Start/stop continuous measuring (F9)

Running of the wheel (F10)

Left (vertical) toolbar

Increases the image of profile (Ctrl+L) or (sign "+" on "grey" keyboard)

Decreases the image of profile (Ctrl+L) or (sign "+" on "grey" keyboard)

Includes the window of setting of brightness/contrast

Includes the window of setting of topological marks

Turns on/turns off horizontal marks on an echogram

Turns on/turns off topological marks on an echogram

Adjustment of null Depth

Turn on of tool Trace (reflection of single trace)

Turn on of tool Hand (dragging of echogram, if it is not placed in a window wholly)

Turns on/off of the window of tools

An informative bar is located in the lower part of main window; the basic setting of current profile is represented in it: start of window of involutes, stop involutes, setting of trace stacking, sounding window extent and comments to the current profile.

Preparation of measuring site

During the lead through of measuring it is needed to provide the permanent contact of device with the sounded surface, therefore at preparation to measuring it is necessary to clean a ground from large interfering objects. In the case of measuring without the use of topologger (GPS, IMU) to foresee marking of ground, on which an operator will put the topological marks, by hand.

You will prepare site If it need cover the measure site mash of profiles and use measure wheel.

You need use measure wheel if you have plane in future use Slicer software.

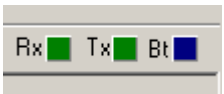
☑ **At measuring on a ground with a strongly rugged surface, in the system the output of data is foreseen in the point mode. A device is not stretched out thus, but moved from a point to the point, that allows executing measuring even in the dense forest.**

Preparation of radar

Connect the GPR and COM computer port by the enclosed cable. The power supply of radar turns on in the moment when the socket of cable is inserted in its nest.

Start the program Synchro2.exe (Button **Start > Programs > Transient Technologies > VIY > Synchro2)**

Make sure in a presence connection with the radar - indicators Rx and Tx in the right upper corner of the main window must blink approximately once a second.



☑ **If the indicators are absent. Open the window of setting of ports. In this window make sure, that it is chosen COM port which radar is connected to.**

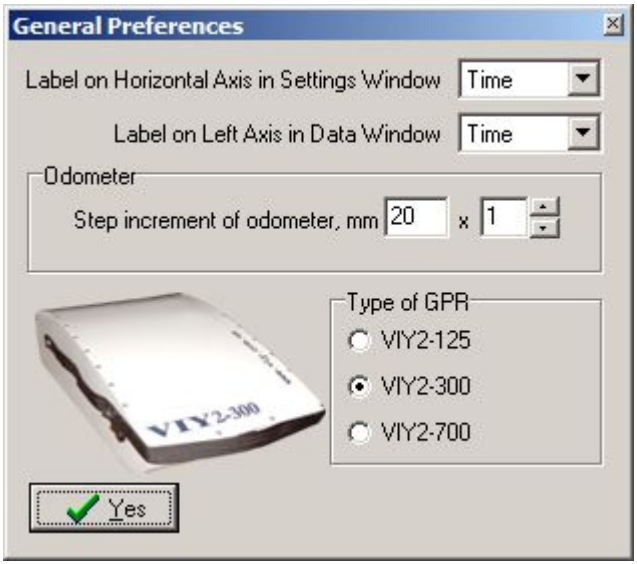
☑ **If an indicator are present, but does not blink. Open the window of setting of ports. In this window make sure, that it is chosen COM port which radar is connected to, after that in "Advanced" tab make sure, that Bit rate set 115200 bod.**

Pressing for topographic button or rotation of the odometer leads to flashes of indicator Bt

When using a measuring wheel attach it using suction cups to the top cover of GPR. Lever wheel should move freely in the vertical plane. Disconnect topographic button and connect the measuring wheel. After this Bt indicator will flash when the rotation of the wheel.

General setting

For viewing/changing of the general setting for whole program, turn on the window "General preferences" (In the menu of the program to choose Preferences > General Preferences)



This window serves for setting of the left scale in the windows of profiles, this scale can be graduated in time (in nanoseconds) or in selections. For a lower scale in the window of setting, this scale can be graduated in selections, in time (nanoseconds) or on a depth (meters).

Step increment of odometer – distance between two signals of measuring wheel. Information about this parameter find in odometers documentation. For increase step of measure in profile use multiply coefficient.

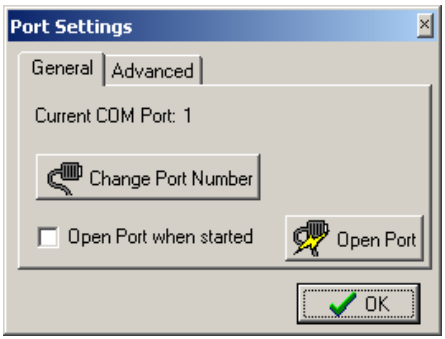
For example, step of odometer = 20 mm, multiply coefficient = 5, in result step in profile will equal 10 Sm.

An important parameter of setting of work of the program is a type of using radar. Changing the type of radar is possible; you must click in a frame "Type of GPR" on a necessary type.

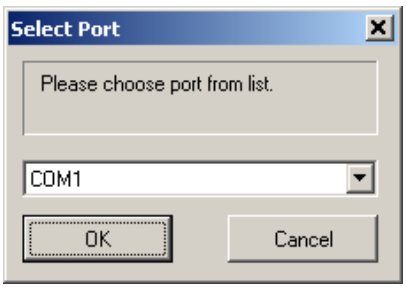
Information about the type of radar is saved in every file of data. Changing the type of radar is possible only while, measuring is not begun.

Setting of port

Turning on the window of the setting of port (In the menu of the program to choose Preferences > Port Settings or to click the button in the upper toolbars.), choose necessary port; click the button Change Port Number.

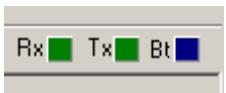


A dialog, containing a drop-down list with all accessible ports, will appear.

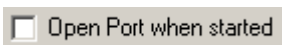


Choosing port, click the button

If port was successfully opened, then indicators Rx, Tx and Bt will appear in the right upper corner of the main window of the program.



If you are sure, that during a next session you will use that port you can put a mark



Then port will be automatically opened at the start of the program

Features of the use of transformers USB-RS232

In modern notebooks successive port (RS232) is often absent.

In this case the complete set of GPR is included USB to RS232 cable

☑ **Original appearance and brand of transformer can change**

The compact disk with drivers for the different operating systems uploads in a complete set USB to RS232 transformer. Before the beginning of work with GPR, install a necessary driver, following the enclosed instruction.

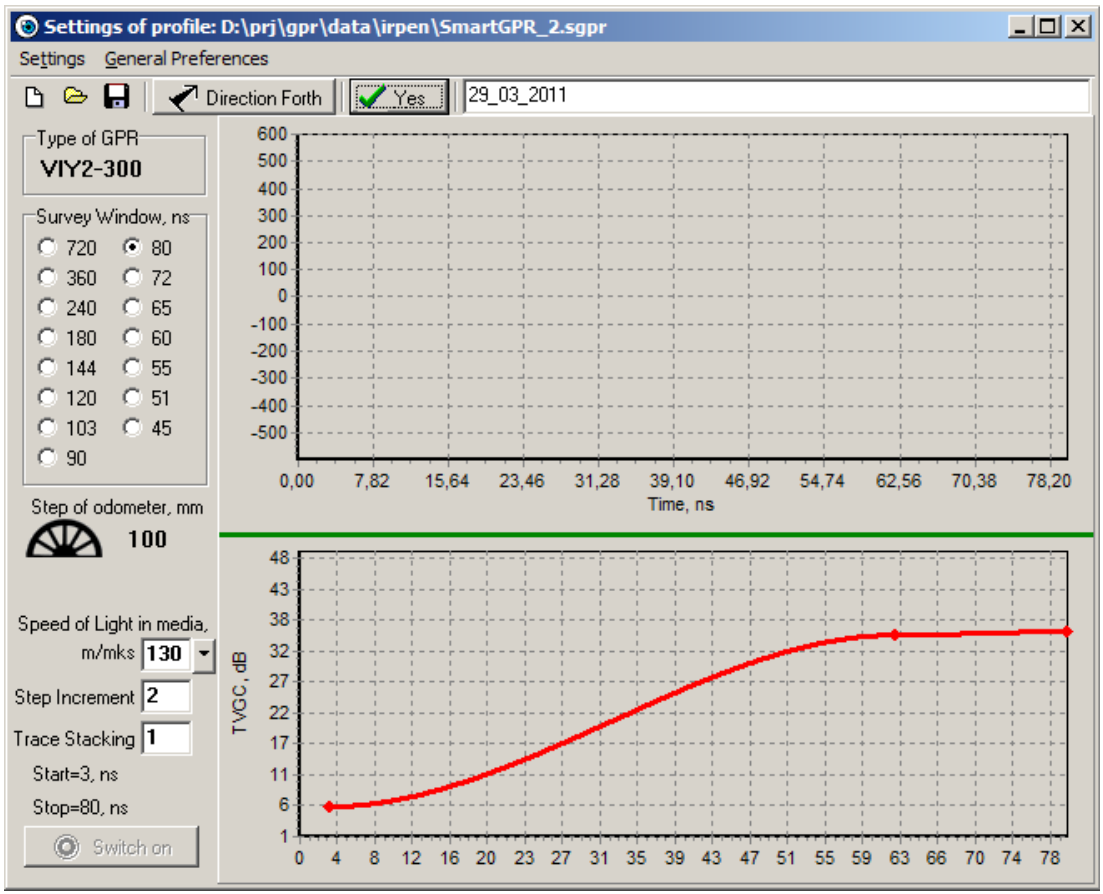
After installation of drivers connecting of transformer to USB port of the computer causes appearance the successive port in the system among the equipment of computer. The number of this port is appointed automatically.

☑ **A user can use any other transformer USB to RS232. In case if the button for topological marks is used connected to data cable between GPR and computer, it is necessary to use transformer USB to RS232 having DTR and DSR!**

Start of measuring. Setting of georadar

Create the new file of data – File > Create, or to click the button in the upper toolbars or on a keyboard “Ctrl+N”

The new window will appear and at the same time the window of setting will be opened for this session of measuring. In this window it is necessary to influence the temporal range of sounding, start and finish of sounding window, within the limits of the chosen range, form of TVGC, speed of light in a media and text comments.



There are two charts in the window of setting, on the upper - reflections of signal of radar, on the lower – a curve of TVGC is represented. For turn on/off the mode of setting of radar click the button

or on a keyboard button F9. The signal of radar will be represented on an upper chart in the real time as an oscillogram. The parameters of setting of radar can be changed real-time, that is after a change, for example sounding windows, the new setting upload to the radar at the same time and properly oscillogram changes.

☑ **After the first saving in the session of measuring of radar data, creation of new window of data is accompanied by opening of window of setting with copied from previous by setting, except for text comments, type of radar and set of accessible temporal ranges.**

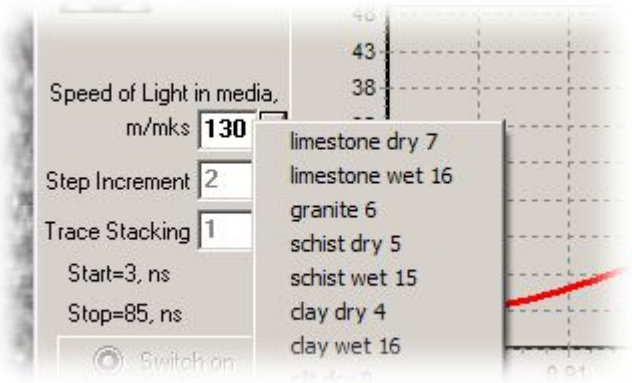
Setting of georadar's type and step of the measuring wheel.

In the upper left side of the settings window is specified type of GPR. If you want to switch the type of radar, call the general settings - click in the settings window menu **General preferences**

Below displayed of configuration the step of measure wheel.

Setting of speed of light in an media

In different media the speed of light differs, and at times considerably, therefore for the correct reflecting of depth on a profile it is necessary to specify the speed of light in this media. The value of the speed of light is uploaded in a window Speed of light, m/mks.



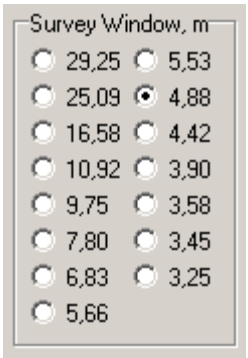
It is possible also to choose the type of media from a list which appears, if to click the button with a black triangle near a window Speed of Light.

After the change of the speed of light the scales of depth of profile and the set of sounding ranges change in media, if they are reflected in meters.

☑ **Changing the value of speed of light in a media is possible and at the subsequent editing of file.**

Setting of temporal range of sounding

Click on the necessary radio-button in a frame “Survey Window" for setting of temporal range of sounding. Amount of possible ranges and their value depend on the frequency range of your radar and its version of execution.



Thus if the button

is down, then the new value of sounding range is passed to radar and a signal, got from radar, will change accordingly.

Setting the start and the finish of temporal window of sounding

Start and finish of sounding window it is possible arbitrarily to change within the limits of the chosen range. This regulation is made dragging by the mouse of initial and last point of curve TVGC. For dragging of point direct the pointer of mouse on it, click the left button, a point will change the color on dark blue, drag the point in the necessary position. At dragging of initial (last) point a curve in a window "Setting" the current value of the beginning and end of sounding window is reflected in nanoseconds. At releasing of point (releasing of the left mouse button) its color will become red again.

Thus if the button

is down, then the new value of finish (start) of temporal window of sounding is passed to radar and a signal, got from radar, will change accordingly.

☑ **A point can be dragged only scope between the scopes of window and nearby point of curve.**

For dragging of all curve wholly at the pressed button Shift click the left button of mouse in any point of screen TVGC, all points of curve will change the color on dark blue, drag a curve in the necessary position. At releasing of the left mouse button the color of all points will become red again.

Thus if the button

is down, then new values of points TVGC passed to radar and a signal, got from radar, will change accordingly

Setting of curve of gain (TVGC)

The form of curve can be arbitrarily changed. This adjustment is made dragging by mouse of any points of curve TVGC. For dragging of point direct the pointer of mouse on it, push the left button, a point will change the color on dark blue, drag the point in the necessary position. At releasing of point (releasing of the left mouse button) its color will become red again.

Thus if the button

is down, then new values of points TVGC passed to radar and a signal, got from radar, will change accordingly

☑ **A point can be dragged only scope between the scopes of window and nearby point of curve.**

For dragging of all curve wholly at the pressed button Shift push the left button of mouse in any point of screen TVGC, all points of curve will change the color on dark blue, drag a curve in the necessary position. At releasing of the left mouse button the color of all points will become red again.

Thus if the button

is down, then new values of points TVGC passed to radar and a signal, got from radar, will change accordingly

For addition of point to the curve click in any place of screen TVGC by the right mouse button.

For the delete of point – click on it the right mouse button at the down button CTRL.

☑ **It is possible to delete any points except for the first and last.**

Setting of Step increment in trace

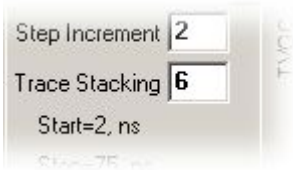
At the set range of sounding and adjusted window of sounding the amount of selections in a trace it is possible to change and also changing a step in a trace. At a step equal 1 all selections will be written down within the limits of window of sounding, at a step equal 2 – every second, at 3 – every third and etc.

The value of step is entered in a window Step Increment. The executed changes are accepted, when a statement passes to other organ of management. For example, at the down button Tab on the keyboard.

Thus if the button

is down, then new values of measuring step passed to radar and a signal, got from radar, will change accordingly

Setting of Trace Stacking



The function of trace stacking is intended for the improvement of quality of image on a profile during the work in the conditions of radio interferences. This rough-down of signal is executed directly in GPR; the treated data already upload in the computer. What higher the trace stacking, the higher degree of filtration. A minimum trace stacking is equal 1; maximal depends on the amount of points in a trace. If to set a greater trace stacking, than possibly – a maximal possible value will be expected automatically.

☑ **At the increase of trace stacking the speed of movement of GPR must go down at measuring. At a trace stacking 2 – in two times, at 3 – in three times, etc.**

Addition of text comments

For comfort of work with radar data it is possible to add to them text comments.

Comments are visible at the active file of profile in a status bar of main window of the program, in the dialog of opening of file and in a window "Settings of profile".

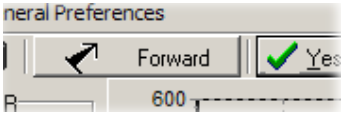
Changing the value of comments is possible both at creation of file of profile and at the next openings of file.

Setting of movement direction

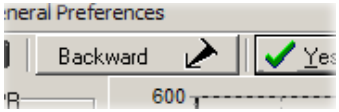
In a case of survey of large number of parallel profiles it is convenient to move the ground penetrating radar in "Zig Zag" mode. The first profile is written in "forward" direction, the second in "backward" direction and then all odd-numbered profiles are marked as "forward" and all even-numbered ones are warked as "backward" accordingly.

To set up the "movement direction" chose a button "forward/backward" in the Options window.

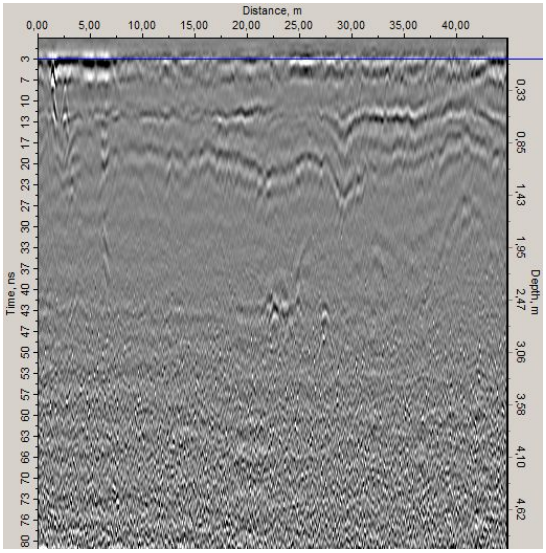
Button indicates a current choice of movement direction.



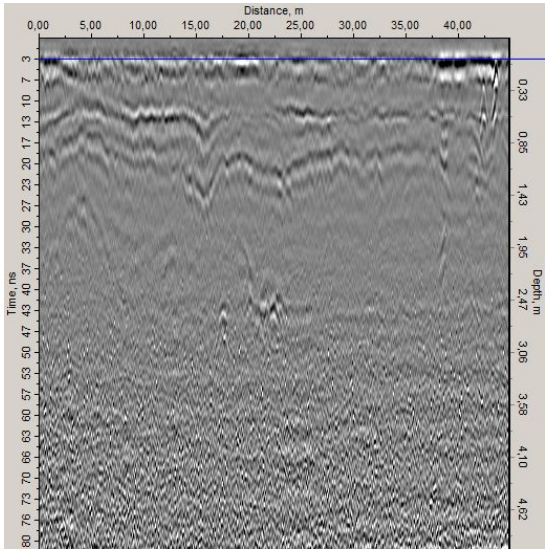
or



The movement direction can be adjusted both before the measurement and after saving the profile file.



Profile with direction parameter forward



backward..

Saving of settings

Settings are kept in every file of radar data. But you can save settings in a separate file, for this purpose in a window "Settings" choose Settings > Save or press on a keyboard Ctrl+S, in an appearing dialog entered the file name.

Using the files of setting saved before

If you want to apply for the current file of data the settings saved before in a window "Settings". Choose “Settings > Open” or press on a keyboard Ctrl+O, in an appearing dialog choose a necessary file. It is possible to choose the file of settings (*.stt) or file of radar data (*.sgpr).

Measuring

After setting of parameters of measuring close the window of setting, press the button on a keyboard Enter or Escape. For editing of setting choose **Settings > Acquisition Settings** or Ctrl+An or click the button in the upper toolbars.

☑ **If measuring were already begun, then you can change not all parameters in setting.**

A device foresees two modes of measuring: **continuous** , **pointed** and **run of the wheel**.

Pressure F8 or the button is started by measuring of only one point, after that there is a stop of measuring, after that it is necessary to move radar on new position and press F8 ( )again.

This procedure needs to be repeated so many times, how many points of sounding it are required to have on an profile.

In **continuous mode** a statement gives commands on beginning and on the stop of measuring. Start of measuring – press on a keyboard F9 or button , press once again F9 ( ) - stop the measuring.

Push the button F9, thus the button will change a color – . Stretch radar on the surface of measurable ground. The speed of movement is determined by the adjusted parameters. You can orient on blinking of indicator Tx on the main window of the program. Speed gets out from a calculation 5...10 flashes of indicator on the linear meter of profile. At more high-speed of moving the contrast of the got profile can become worse.

In measurement mode, **Run of the Wheel** track in the profile is measured with a fixed step horizontally. This is achieved by using a measuring wheel.

Before you start measuring the profile measuring wheel to attach the top cover of the device, and plug the jack wheels instead of topographic button. Create a new profile, Make the necessary settings, make sure to specify general settings right step of measuring wheel. Start your measurement by pressing a button or key on your keyboard F10.

Move the ground penetrating radar on the surface, Rx and Tx LEDs will flash and the profile will increase.

☑ **When exceeding the limit of speed movement of GPR in the dynamics of the computer will be heard a beep. Avoid overexposure signal.**

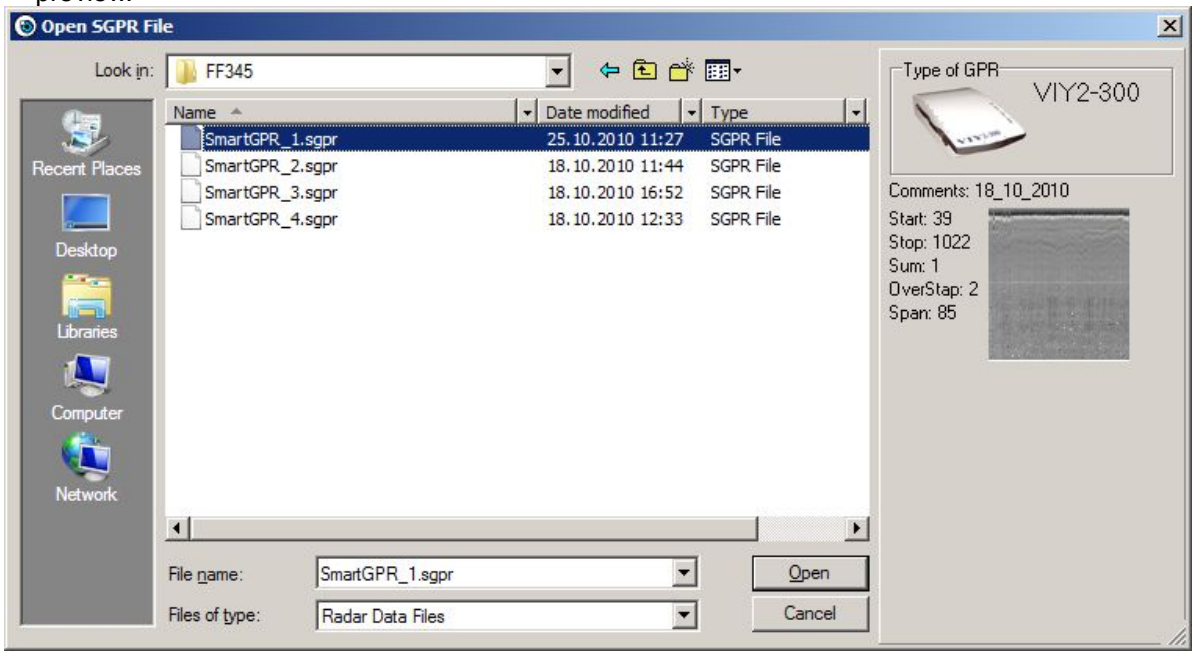
Saving of results

Since radar was extended on the surface of ground it is necessary to save findings for this purpose choose **File > Save (Save As)** or button or press on a keyboard Ctrl+S. A dialog will appear in which upload the file name if it is necessary.

☑ **The results of measuring are kept in files with expansion sgpr. At a saving, except for the file of data, the file of filters is also written down and it has the same name that the file of data, but extension has tls.**

Opening of profile

For opening of profile in the main menu of the program choose File >Open, or click on the button , or press on a keyboard Ctrl+O.The dialog of opening of file will appear which have a bar of preview.



When choice file in the list of files, information about a file will be displayed in the bar of preview - text comments, start and stop points of sounding window, parameters of trace stacking, etc. The reduced image of profile displayed there.

During the work of the program the opened files are memorized. For the rapid opening of recently in-use files choose the programs in a main menu File > Open repeatedly and then the file that is necessary to you.

Storing the data

After you save the profile in the specified folder on your computer, you receive two files: filename.sgpr and filename.tls.

File with the extension **.sgpr** contains all information about settings of the radar, type of the radar, step measuring wheels, etc.. In the same file in an unchanged form the stored data received from the GPR.

File with the extension **.tls** contains information about the post-processing tools, settings of each tools and order of their application.

Thus, the processed data is stored as two files with identical names and different extensions. sgpr and. Tls. No action of the operator cannot permanently damage the GPR data. To display the original data is sufficient to remove all of postprocessing tools.

Versions of data formats.

Transient Technologies company is constantly working to improve its equipment and programs. As a result of changing formats and data storage. Our software supports interoperability as back and forward. That is, previous versions of the program can work with these later versions of the data and vice versa the program later can work with previous versions. The program save always in its current version.

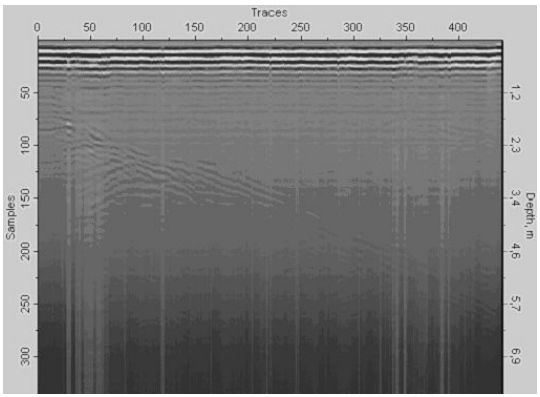
☑ **It must be understood. When the previous program opens the last version of the file, it will not read that part of the data or settings that have appeared in later versions. If the old program saves the file,, this part of the data or settings will be lost.**

The latest version of the software to work with georadar VIY always available on the website of the company www.viy.ua

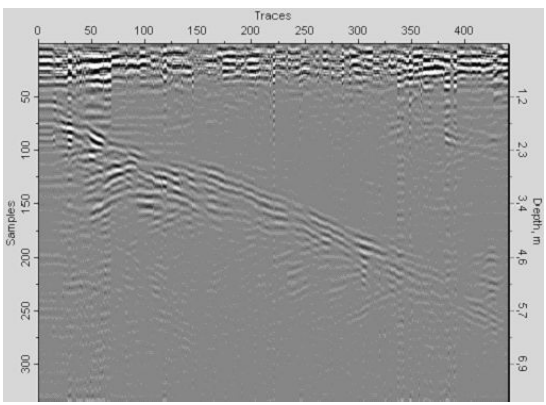
Work with the got results

Processing Results

The program has wide possibilities on the improvement of the got images



Raw profile



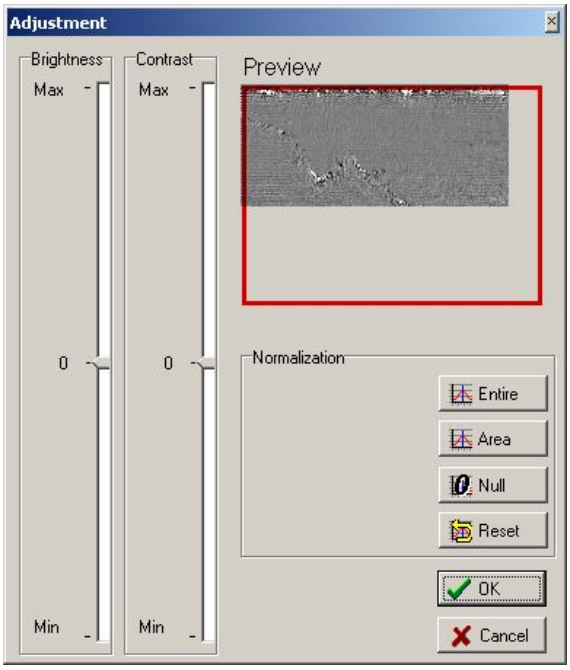
The profile after the processing.

Treatment is executed by using tools

Setting of the normalization

Data which we got from GPR is written down by double-byte numbers, it is surplus for a reflection on a computer. At a reflection the rate fixing is produced, the parameters of this rate fixing can be changed in a window "Adjustment" in the usual terms of adjustment of brightness and contrast.

Choose Picture >Brightness/Contrast (or click the button or press on a keyboard Ctrl+F).



In a window Adjustment there are two rendering-engines – Brightness and Contrast for adjustment of brightness and contrast accordingly. The results of changes are visible in a window Preview.

The group of the buttons Normalization serves for the automatic setting of brightness and contrast.

If you click the button "Entire" in all volume of information are the most and the least value, and from these data the normalization is produced.

If you click the button "Area" a maximal and minimal value for the normalization is searched not in all volume of data, but only in area which is selected of the red scope. A selection is made by a mouse.

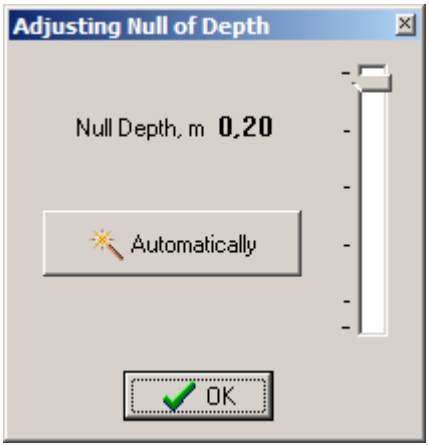
If you click the button "Null" a brightness and contrast are set in a zero.

If you click "Reset" a brightness and contrast is set on values which were in the moment of opening of the window Adjustment.

If you click the buttons Ok and Cancel there is closing of window Adjustment, thus Ok applies new values, and Cancel closes a window without application of changes.

Adjusting Null of Depth

To fine-tune the depth scale, press the button , in the dialog box set the zero scale manually using track bar. Or, click Automatic.



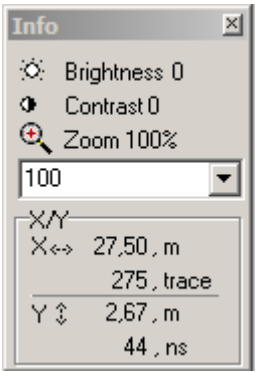
Zoom the profile

If it is necessary to change the scale of reflection is possible by the buttons , or buttons of '+' and '–' on a grey keyboard, or use the wheel of mouse.

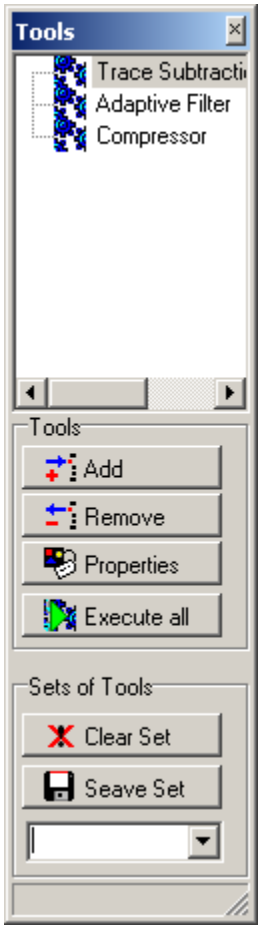
Info window

The chosen scale and current setting of brightness and contrast are visible in a window Info. Turning on/off of this window is made by a choice Window->Info or by down on a keyboard Ctrl+I.

When moving the cursor over the profile in the Info window displays the coordinates of the cursor. X coordinate is displayed in meters (if the measurements were made using a measuring wheel), as well as the route number. Y coordinate is displayed in meters, and in nanoseconds.



Work with tools



Processing of GPR profiles in the program "Synchro2" is organized so that the initial variant of findings (*.sgpr) and the file (*.tls) always kept in a computer, the list of the applied tools, their parameters and order of their application, is kept in which.

Thus, at opening the file treated before, at first all operating will be executed under processing of data, and then a profile will be represented on the screen.

For the display of set of the applied tools and a window Tools serves for their management. To turn on/off this window you can press on a keyboard Ctrl+T or choose **Window** ->**Tools**.

List of applied Tools represented as a tree. A management of tools is carried out by the buttons in the lower part of window Tools or by a mouse straight from the tree of tools.

The icon of the tool in a tree looks like

During processing of profile this tool a green triangle appears near its icon . If we have little time of processing a tool, the change of icon can be not noticed.

If you turn off a tool, its icon will look so

In case if a file is opened with set of tools, and you do not have one of tool, its icon will look so

Addition of new tool

Click the button

in a window Tools – a dialog box "List Of Plugins" will appear, in which all tools accessible on your computer will be transferred. At a choice any lines description of this tool will appear. If you chose a necessary tool, click "Apply Tool" – the window of setting of the chosen tool will appear, influence the parameters of tool, at the changes of parameters the result of application of this tool is reflected in the window of data at the same time. After setting in the window of tool click "Add" – a tool will be added. If an tool is not needed for this profile, then press "Cancel" – a tool will not be added.

Delete of tool

Choose a necessary tool in a tree, click the button

– a tool will be remote.

Editing of tool

Work with tools is organized so, that you can always change the parameters of instrument and it does not depend upon its position in the tree of tools. At the change of parameter of tool the processing of profile is executed, beginning from a current tool, after that all located below.

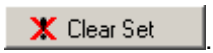
☑ **All tools have one general parameter – Executing. This parameter helps not deleted a tool, but turn it off. You can also turn on/off this parameter from the context menu which appears when you click the right button of the mouse on a tool in a tree.**

Change of order of application of tools

For some tools the order of application is important, an order can be changed arbitrarily.

Drag the tool in a tree into the necessary place with a mouse, the result of moving reflected right after the putting of tool on a new place.

Delete of all tools

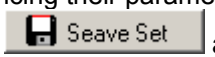
For a current profile it is possible to delete all filters with the button 

.

☑ **Thus filters from the system, from other profiles and from the sets of filters will not be remote.**

Saving of sets of tools

Addition of necessary tools is a comfortable process though, but however requires a few minutes. For spending minimum time at processing of data the set of tools can be saved for further rapid application.

Getting the first profile, apply to it the tools, if it is required, influencing their parameters and order of application. In the lower part of the window Tools click the button 

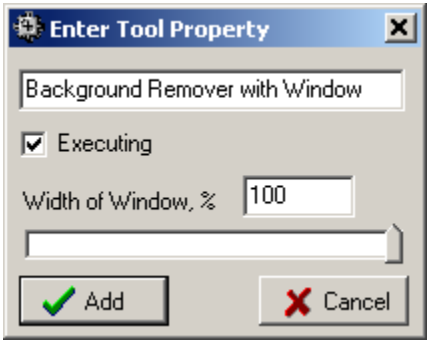
and in an appearing dialog set the name the file for this set. After a saving the name of this set will appear below in a dropping list.

Application of set of tools

Executing the next measuring, save the file of profile and fail the set of tools to it. For this purpose click on a falling out list in a scope "Set of Tools" windows Tools. Choose a necessary set in the opened list, here for a current profile all tools will delete and the tools from a set will apply.

Background remover with window

Window for tool management



In an upper line uploaded the name of filter, as it will be named in the tree of tools.

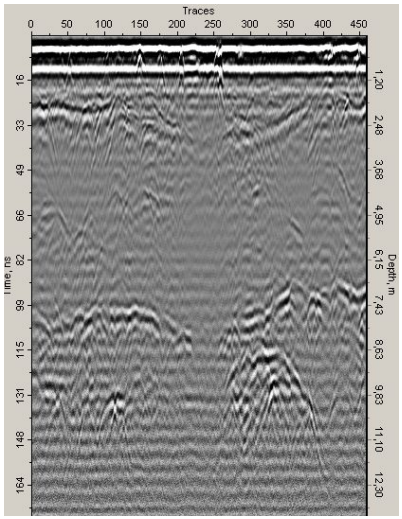
At addition of filter its name it is its type - Background remover with window, this text can be changed.

If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.

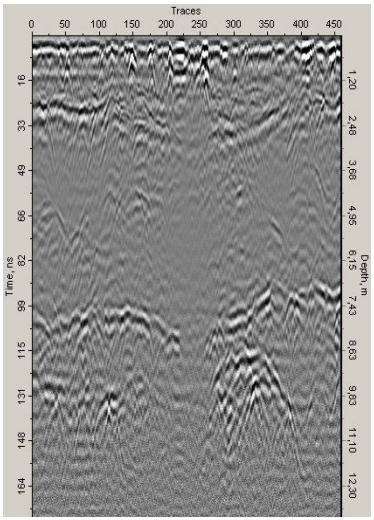
☑ **If your computer not very rapid or you process a very large profile, and there is a delay on application of all tree of tools at the change of parameters of filter, turn off a parameter Executing, make the setting of tool, after that turn on a parameter Execution again.**

Filter is a tool from an profile - horizontal stripes. Parameter the width of the window manages the sensitiveness of the tool – the less its value, the stronger horizontal lines removed in a profile.

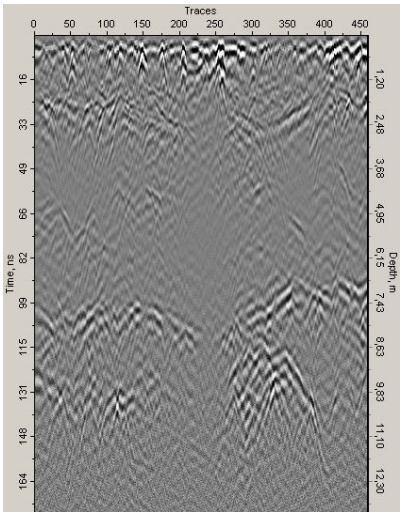
Background remover with window



The initial profile



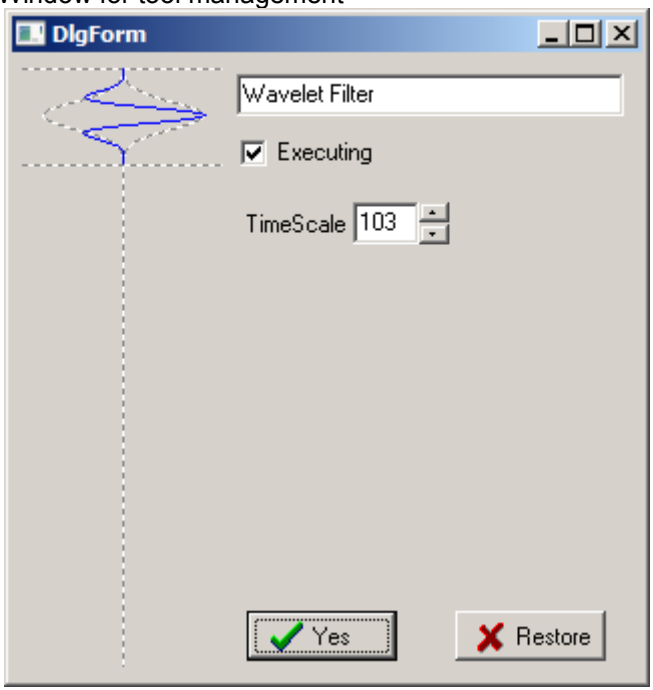
The profile after the processing with a tool, width of window – 100%



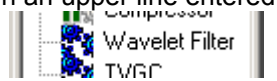
The profile after the processing with a tool, width of window – 7%

Wavelet Filter

Window for tool management



In an upper line entered the name of filter, as it will be named in the tree of tools.



At addition of filter its name it is its type - Wavelet Filter, this text can be changed.

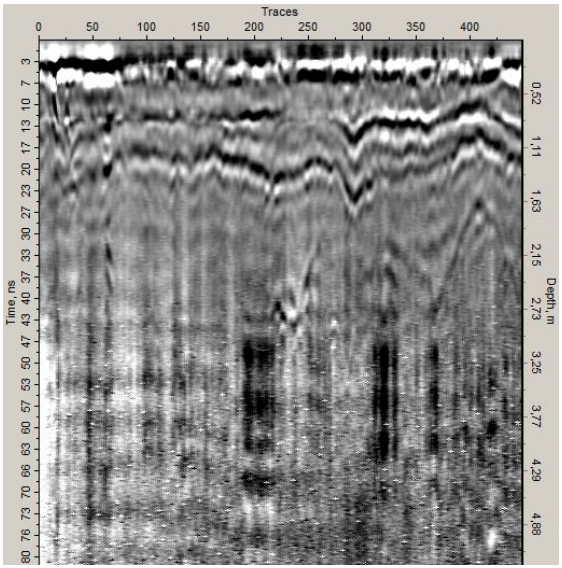
If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.

☑ **If your computer not very rapid or you process a very large profile, and there is a delay on application of all tree of tools at the change of parameters of filter, turn off a parameter Executing, make the setting of tool, after that turn on a parameter Execution again.**

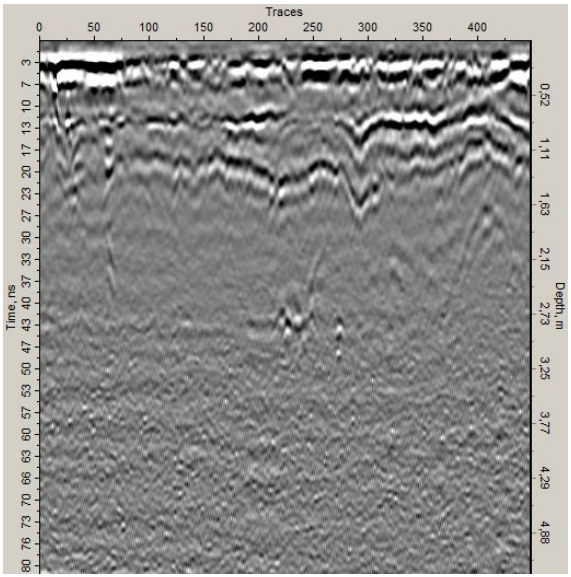
Wavelet Filter

In the case of traffic radar on an uneven surface, as well as in case strongly varying surface properties in the profile appear spots of different brightness. To remove these stains, as well as to eliminate noise at high signal amplification is a tool Wavelet Filter

Parameter the Vertical base is chosen such, to distort the useful elements of the profile minimally.



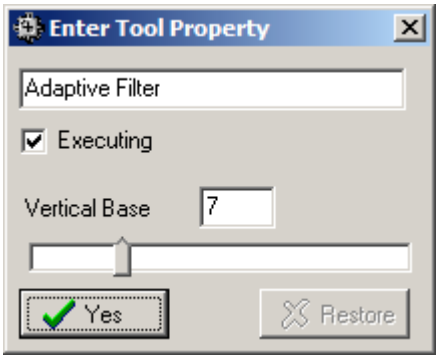
The initial profile



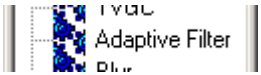
The profile after the processing with a tool

Adaptive Filter

Window for tool management



In an upper line entered the name of filter, as it will be named in the tree of tools.



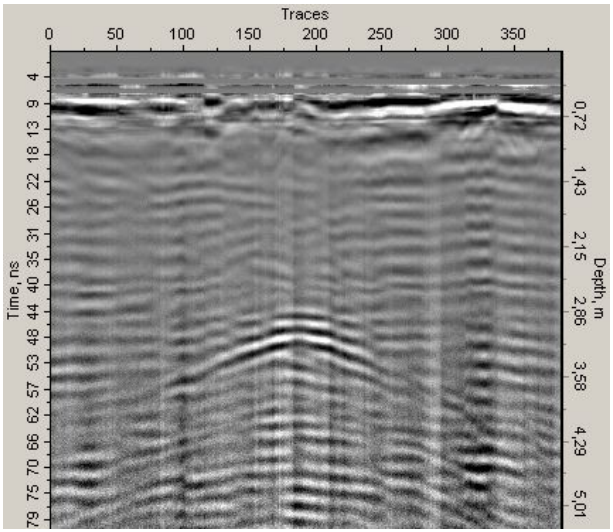
At addition of filter its name it is its type - Adaptive Filter, this text can be changed.

If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.

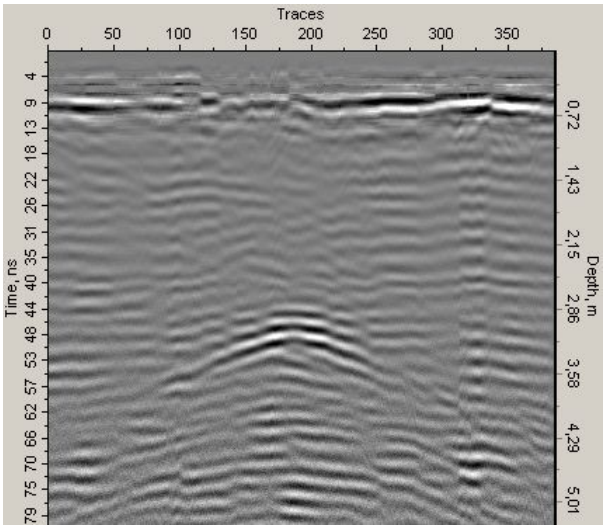
☑ **If your computer not very rapid or you process a very large profile, and there is a delay on application of all tree of tools at the change of parameters of filter, turn off a parameter Executing, make the setting of tool, after that turn on a parameter Execution again.**

If at measuring the GPR moves on an uneven surface and its corps tipped strongly or there are mixing objects or puddles directly on a measurable surface, then the vertical stripes of different width appear on a profile, the brightness of profile can differ strongly in these stripes. A tool Adaptive Filter serves for diminishing of influence of this effect.

Parameter the Vertical base is chosen such, to distort the useful elements of the profile minimally.



The initial profile



The profile after the processing with a tool

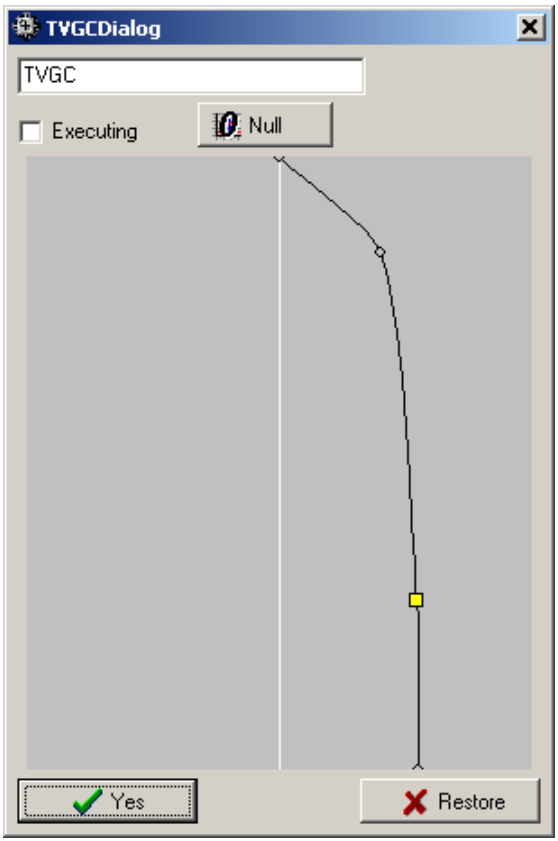
Time varying gain control (TVGC)

Window for tool management

In an upper line entered the name of filter, as it will be named in the tree of tools.

At addition of filter its name it is its type - TVGC, this text can be changed.

If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.



☑ **If your computer not very rapid or you process a very large profile, and there is a delay on application of all tree of tools at the change of parameters of filter, turn off a parameter Executing, make the setting of tool, after that turn on a parameter Execution again.**

If at measuring the profile of strengthening was not optimum chosen, a tool TVGC can cause strengthening. Its window of management differs from the windows of other filters – the height of window changes automatically so that the height of curve of strengthening is equaled the height of profile. If the height of profile is large and it cannot be placed in a window, before reflecting of window TVGC the scale of reflecting of profile will change so that all profile will be placed in a window on a height.

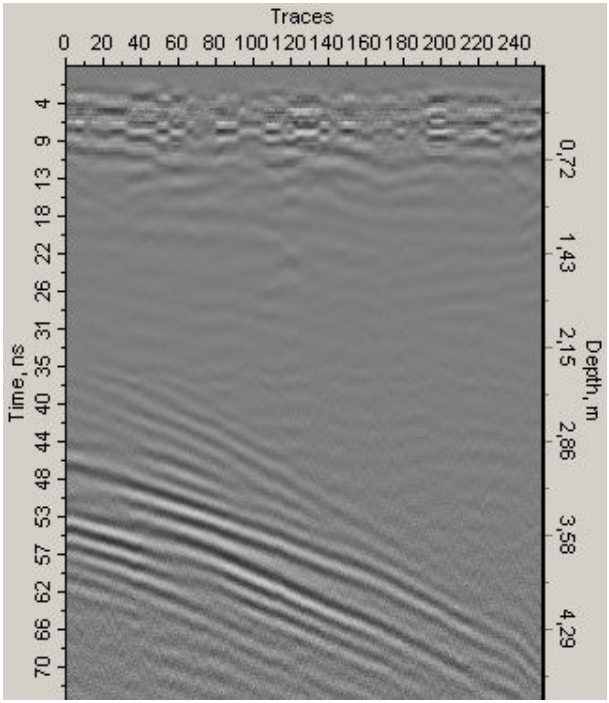
The adjustment curve of tool has two key points at first, which can be moved only on an upper and lower edge accordingly. You can add plenty of intermediate key points on a curve. Its original appearance changes, when a cursor of mouse is above a key point.

For addition of key point down and retain the button on a keyboard Ctrl and click in the right place in the window of filter by the right button of mouse – the new key point will appear.

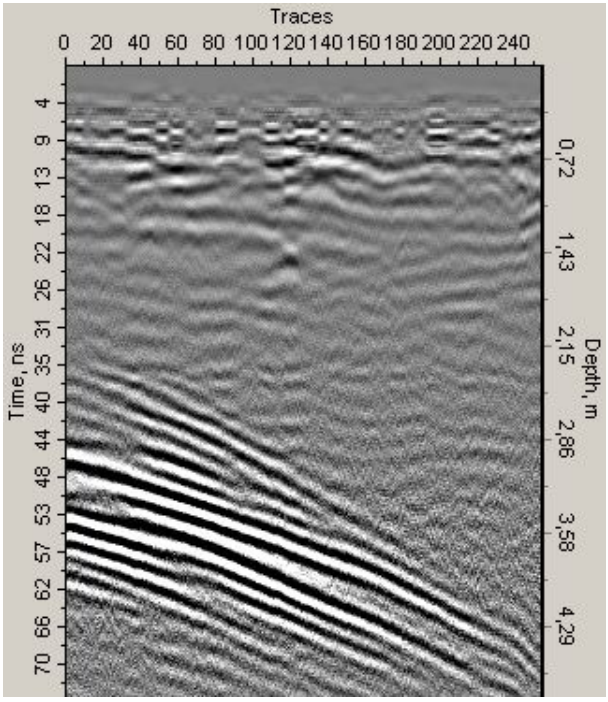
For the delete of key point down and retain the button on a keyboard Ctrl and click on a necessary key point – this key point will disappear.

The button

serves for the delete of all intermediate key points and return of curve of strengthening in initial position.



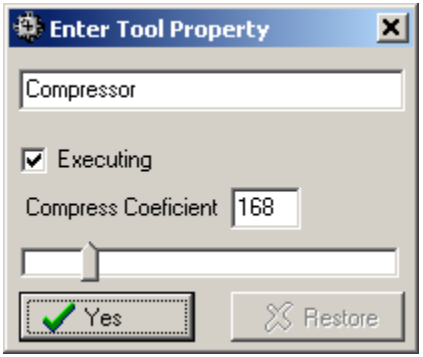
The initial profile



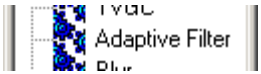
The profile after the processing with a tool

Compressor

Window for tool management



In an upper line entered the name of filter, as it will be named in the tree of tools.

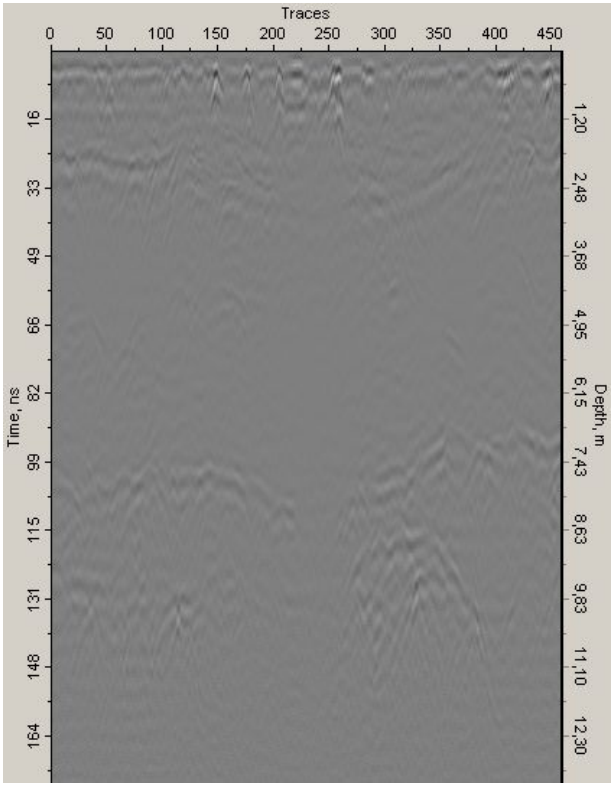


At addition of filter its name it is its type - Compressor, this text can be changed.

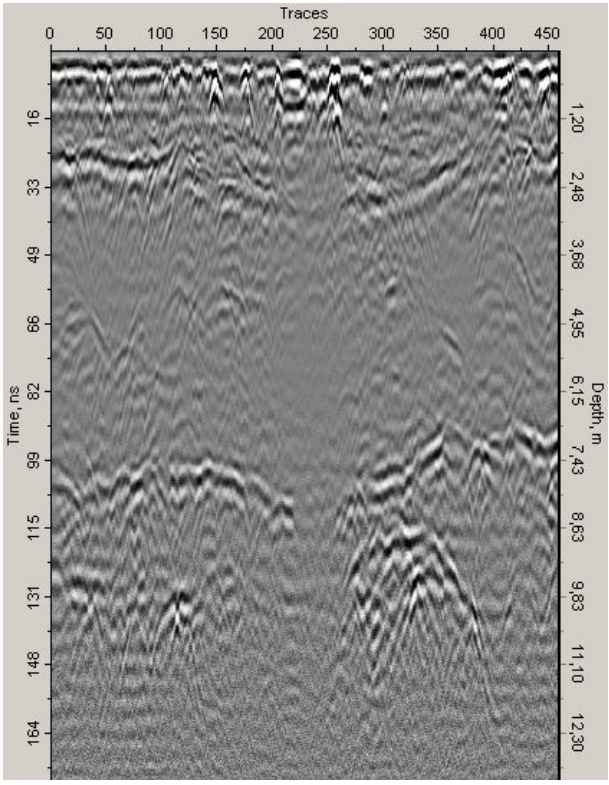
If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.

☑ **If your computer not very rapid or you process a very large profile, and there is a delay on application of all tree of tools at the change of parameters of filter, turn off a parameter Executing, make the setting of tool, after that turn on a parameter Execution again.**

Tool Compressor strengthens weak signals and does not strengthen bright parts of profile. In other words evens all parts of profile on amplitude. The degree of this smoothing is set by a parameter Compress Coefficient.



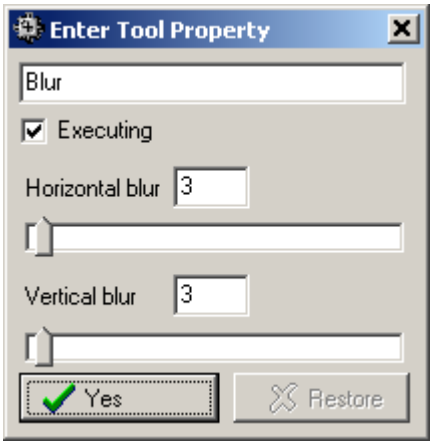
The initial profile



The profile after the processing with a tool

Blur

Window for tool management



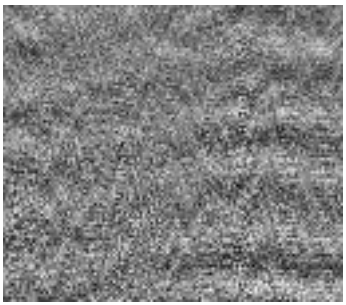
In an upper line entered the name of filter, as it will be named in the tree of tools.

At addition of filter its name it is its type - Blur, this text can be changed.

If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.

☑ **If your computer not very rapid or you process a very large profile, and there is a delay on application of all tree of tools at the change of parameters of filter, turn off a parameter Executing, make the setting of tool, after that turn on a parameter Execution again.**

Filter Blur diminishes influence of hindrances in a profile which show up as shallow "shrivel" or "sand". This filter has separate adjustment of washing out on a horizontal line and vertical line.

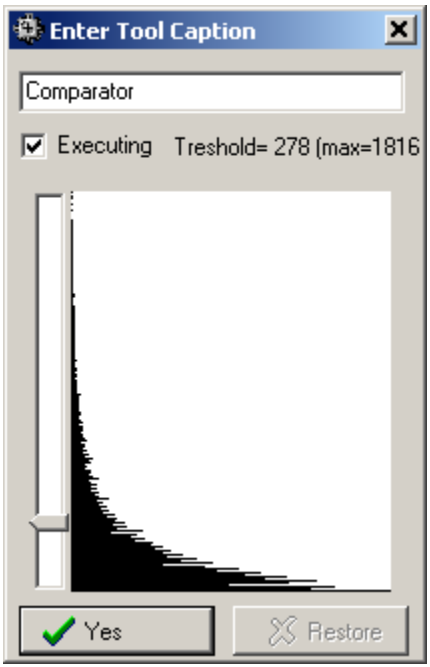


The initial profile

The profile after the processing with a tool

Comparator

Window for tool management



In an upper line entered the name of filter, as it will be named in the tree of tools.

If a parameter Executing is marked, all changes in setting of tool are used to the profile at the same time. If a tool is placed in upper part of tree of tools, then after the application of current tool will be used the all tools which located below.

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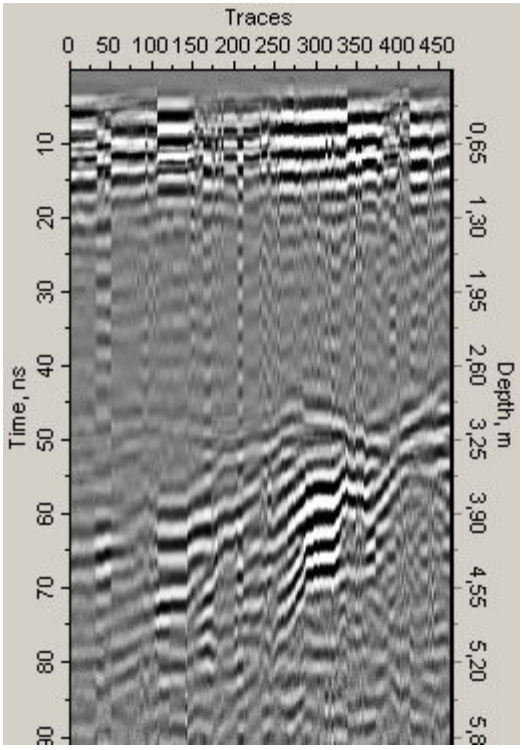
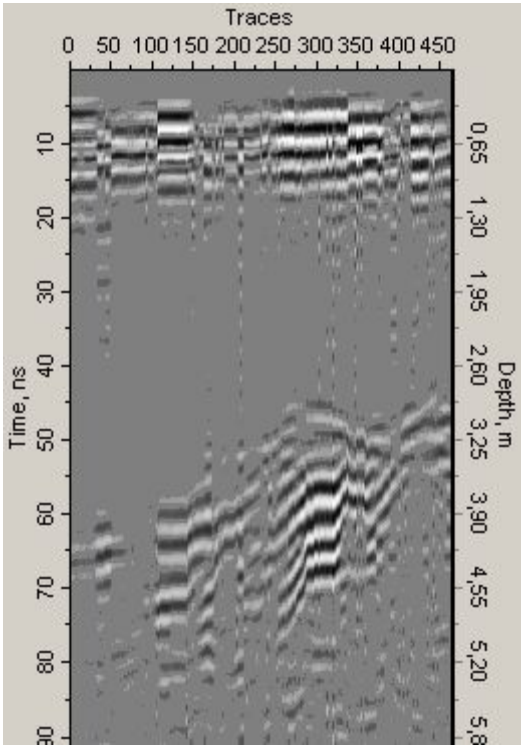
Tool Comparator cuts weak signals, deleting everything, that less than the level. A level, which signals are cut on, is set by a slider.



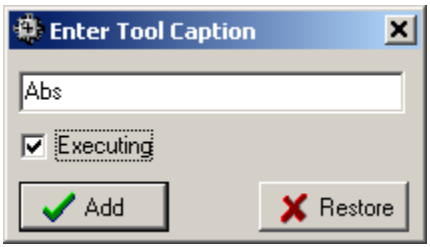
The initial profile



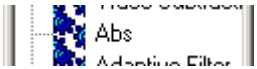
The profile after the processing with a too

Abs

Window for tool management



In an upper line entered the name of filter, as it will be named in the tree of tools.



At addition of filter its name it is its type - Abs, this text can be changed.

Tool Abs intended for exposures of specific features of profile at the search of certain goals (for example, areas of moistening). The action of tool converts an initial signal into the same polarity (that, polarity of all selections of trace becomes the same). Usually tool Abs used jointly with a tool Filter (filter of LFS).

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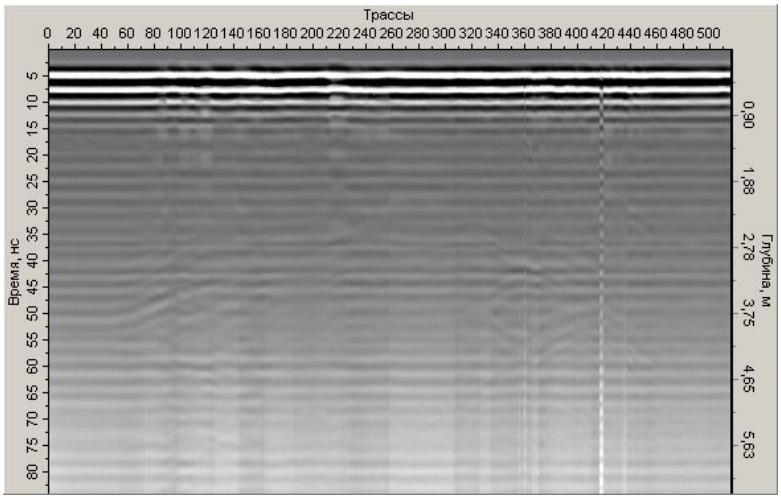
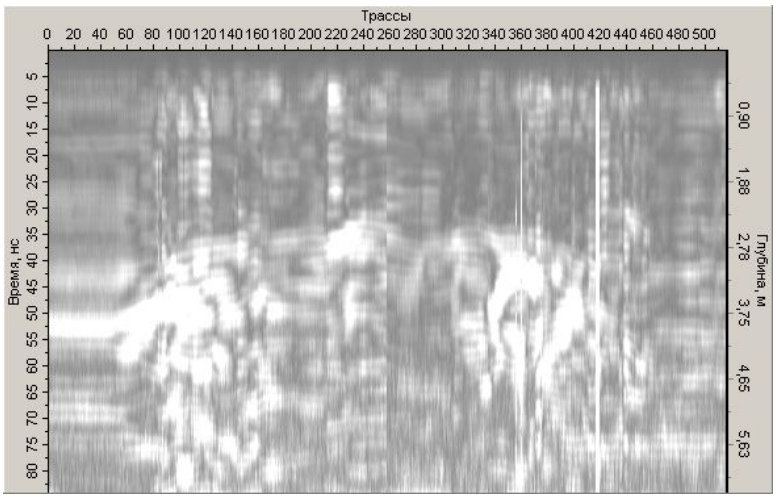


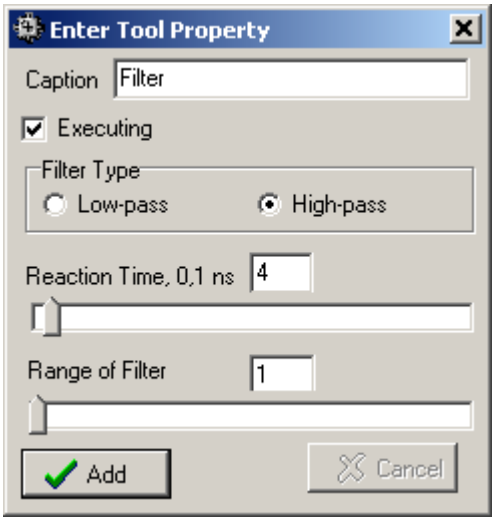
The initial profile



The profile after the processing with a tool

Filter

Window for tool management



In an upper line entered the name of filter, as it will be named in the tree of tools.

At addition of tool its name it is its type - Filter, this text can be changed.

Tool Filter intended for adjustment of spectrum of initial signal (line).

In a section "Filter Type" the filter of lower or upper frequencies gets out. The actions of lower-frequency filter smoothes out the form of trace. Its affecting is alike filter Blur, but it is one-dimensional. The action of high-frequency filter takes away slow fluctuations of trace. Its influence is alike on the action of filter Adaptive Filter; however its influence does not distort the form of signal.

Parameter "Reaction Time" determines frequency of cut. It is possible to set directly in a window or by a rendering-engine. Increase permanent of time narrows the stripe of key-in of lower-frequency filter and increases the stripe of key-in of high-frequency filter.

Parameter "Range of Filter" sets a fading (slump) steepness and can change from 20 db/ten-day period (1) to 80 db/ten-day period (4).

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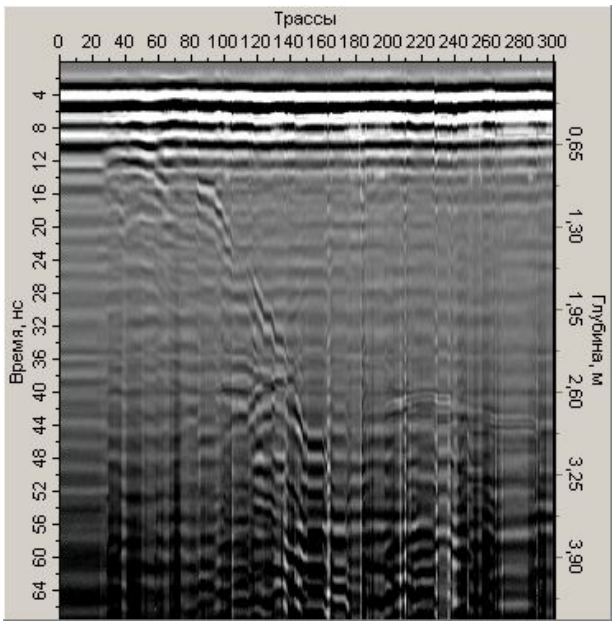
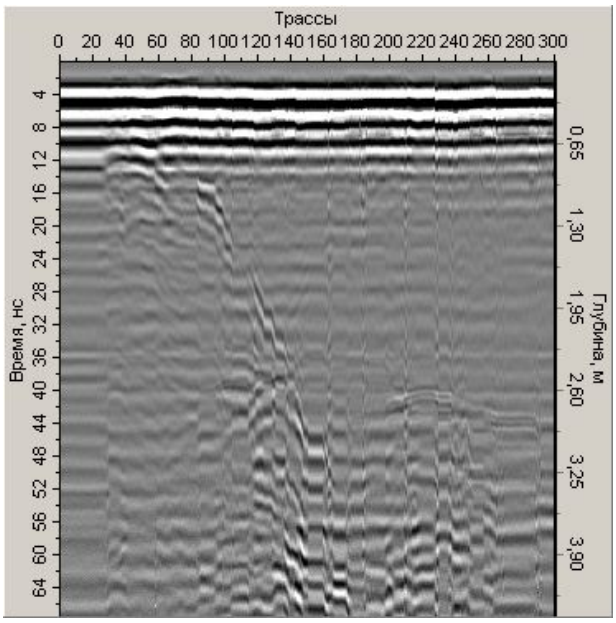


The initial profile



The profile after the processing with a tool

Print of profile

For the receipt of paper copy of the got and treated data choose File > Print (or push the button or on a keyboard press Ctrl+P). In the appearing window of dialog of print execute, if it is necessary, setting of printer and start a print.

The treated data is always printed, that is with taking the applied tools.

Export, import

Export in a format BMP

For an export in a graphic raster format choose in a main menu File->Export->to BMP. The dialog of saving appears in which it is suggested to save a file with the name of profile, but with extension .bmp. You can change the file name if it is necessary.

Export in a format WMF

For an export in a graphic raster format choose in a main menu File->Export->to WMF. The dialog of saving appears in which it is suggested to save a file with the name of profile, but with expansion .wmf. You can change the file name if it is necessary.

Export in a text format

The program allows exporting findings in a text file, for this purpose chooses File->Export->to .dat. Thus, the dialog appears in which it is suggested to save a file with the name of profile, but with expansion .dat. You can change the file name if it is necessary.

The data is exported in the text file of kind:

```
xx yy ffff
xx yy ffff
xx yy ffff
```

where:

xx - a co-ordinate X

yy - a co-ordinate Y

ffff - a value of amplitude

Values in a line part a blank.

Export in other formats

Company Transient Technologies constantly works above perfection of the software. Due to it changes and additions can appear in the program, in case if there are additional funds of export/import in your program in the main menu of the program in sections File->Export and File->Import the proper menu items appear.

Service and care

A device is equipped built-in not serving an impermeable acid accumulator by a capacity 7 And/ch. The built-in source of feed of GPR prevents the deep digit of accumulator; therefore an accumulator does not need service. At a digit a device it is necessary to charge included in the complete set of delivery a charge device 12 VDC. There are two indicators on the overhead lid of charge device: red is an indicator of feed, green – switches on at the fully charged accumulator.

The order of connecting of charge device

Connect a charge device to the network 220 VAC, on an overhead lid a red and a green indicator switches on. Connect a charge device to GPR, in a few seconds a green indicator will turn off.

If the green indicator turns on, it means that the accumulator is charged.

Time of complete charge of built-in accumulator is no more than 12 hours.

☑ **For charging of built-in accumulator use only a charge device from the complete set of delivery. Replacement of accumulator is repair, not getting under the action of guarantee service.**

Limited Warranty

Warranty. Transient Technologies warrants the enclosed hardware products to be free from defects in material and workmanship for a period of twelve months from the date of original retail purchase. Transient Technologies warrants the enclosed user manuals are delivered to be free from physical defects for a period for twelve months form the date retail purchase.

Repair Procedures, Exclusive Remedy. Transient Technologies will, at its option, repair or replace products not conforming to this limited warranty at no charge. This is the sole and exclusive remedy available for breach of warranty or under any other legal theory with respect to Transient Technologies product. If you find a product to be defective, contact your authorized Transient Technologies representative or Transient Technologies. When you receive authorization, return the product as directed, including proof of purchase and date, at your expense and risk. Product repairs not covered by warranty, and product updates, will be provided at a set rate.

Limitations. This warranty is avoid if the product is damaged by importer or abnormal use or by accident, if the product is altered or modified in any way, or if any attempt is made to repair the product without authorization from Transient Technologies. It is solely the purchaser's responsibility to determine the suitability of these products for each particular application. Transient Technologies products are in all events not suitable, and are not authorized, for use with systems potentially injurious to life or health. This warranty is not assignable.

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